

THURSDAY, JUNE 25, 1903.

SCIENCE AND THE NAVY.

II.

IN a former article¹ we referred at some length to the new Navy scheme, pointing out that in our opinion the scientific education of naval officers, and therefore the whole naval service of the country, must be vastly improved by its provisions. Since this article appeared there have been debates in both Houses of Parliament, including a most important one on May 9, in which Lord Selborne in an admirable speech gave some new information concerning the proposed scheme of education, and on the 15th inst. a circular letter was issued relating to the selection, training, and advancement of navigating officers. There has also been much discussion in the public Press; in this, as was to have been expected, scientific questions have been only lightly touched; and when the engineer question has been broached, its relation to the Admiralty practice regarding the other officers who must possess high technical knowledge has not, in our opinion, been pointed out.

But when we pass from the criticism of the new arrangements to the first steps actually taken to give effect to them, the opinion is quite general that the Admiralty is to be entirely congratulated. Prof. Ewing, who may be looked upon as the creator of the admirable engineering school at Cambridge, thereby showing that his powers of administration and organisation are on a par with his scientific acquirements, has been selected to fill the post of Director-General of Naval Instruction; his duty, we take it, will, to a large extent, be to do for the *personnel* what the Director of Naval Construction does for the *matériel* of the fleet.

We may be convinced not only that with such a strong man as this at the helm the complete scientific instruction of officers will be insisted upon, but that practical laboratory instruction of the juniors in mathematics and pure science will be secured.

Indeed, we may go further, and say that they have already been secured in most admirable fashion, for Lord Selborne, in the speech to which we have already referred, spoke as follows:—

“Without pledging myself to exact detail, I will give a general sketch of the kind of education that will be given. It includes not only that special education for which the school will exist, but that general education which every officer and gentleman ought to have. History, geography, physical geography, English and French will be taught. I do not say that other modern languages will not be taught. Mathematics, algebra, arithmetic, trigonometry, mechanics, physics, laboratory work, seamanship, drill and engineering will be taught. There will be laboratories and workshops in which the boys will be accustomed to the use of tools from the very commencement. There will be vessels of all sorts for use and demonstration, from a launch to a battleship, and generally an effort will be made, while not neglecting the general education of the boys, to start them from the moment of their entering the college on the education of a naval officer.”

¹ Vol. lxxvii. p. 289.

When we compare this programme with the one hour a fortnight in physics in the *Britannia*, and no laboratory within sight, students of science will recognise that naval education for the future will be conducted on business principles, and we may again express our regret that such a system, *mutatis mutandis*, is still a thing to hope for in some dim distant future in the case of the Army.

In our former article we pointed out how the subject of navigation suffered generally from the absence of a school afloat for practical work similar to those provided long ago for gunnery and torpedo work. Not only is this defect in the system to disappear in the case of the junior officers, but as stated in the circular letter to which we have referred, the regulations for the instruction of navigating officers have been revised so that a definite course of practical training may be given them in a navigation school ship which is about to be established at Portsmouth, with a suitable staff of instructors. The course of instruction while they are attached to the school ship will last for ninety working days, part of the time being spent at sea in the ship and the remainder on shore. While going through the course they will live on the school ship.

After the candidates have qualified in the school they will serve for a short period in the large ships of the Mediterranean, Home and Channel fleets, so as to obtain experience under the navigating officers in the work of a fleet in regard to navigating duties.

It would be difficult to overestimate the importance of these new departures, about which very little has been said in the various discussions of the new scheme, although, in our opinion, they are precisely those by which the greatest benefit to the service will be secured in the future.

Leaving on one side the objections to the new scheme which have been based on prejudice or a complete ignorance of the changes in any naval service which the progress of science has rendered inevitable, we may say that the question of the possible interchangeability of the officers at some distant date has attracted most attention in relation to the new training of the Engineers. On this point opinion has rapidly grown in favour of the new scheme, since inquiry has shown what a large common basis of pure science underlies the proper performance of any one of the specialised duties. The objections, in short, have been held by advocates of technical education in its worst sense, that is, the rule-of-thumb carrying out of practical processes without any inkling of the scientific principles involved.

We indicated in our last article that, although the new scheme provides for a system of interchangeability when once it is in full working order, the present practice is vastly different, and as we consider this interchangeability of paramount importance from the point of view of utilising to the utmost the results of the complete scientific instruction of our naval officers to be provided in future, it is important to return to this subject in somewhat fuller detail to show the important bearing of another part of the new circular.

We may begin by saying that our present naval officers, so far as their *scientific* training goes, may

be divided into two categories, well trained and less trained; these are the equivalents of the "specialised" and "not specialised" of the Admiralty memorandum setting forth the scheme.

The well trained or specialised officers have to deal with (1) navigation (but so far without a navigating school), (2) gunnery with a gunnery school, and (3) torpedoes with a torpedo school. We may say that the lieutenants performing these specialised duties comprise roughly about one-third of the total numbers. They get special allowances for their special duties.

But it must at once be stated that there are many duties on board ship for the proper performance of which special training, not of a scientific character in the ordinary acceptance of the word, is equally required, and, of course, these duties have to be provided for. They are carried on by the "unspecialised" lieutenants, who are roughly twice as numerous as those who have received a full scientific training. These are employed as watch keepers and in connection with general ship duties. They are "deck officers" as opposed to the scientific officers. The less scientifically trained or deck officer gets little or no allowance; on the other hand he is expected to spend money in painting ship. We see then that under the present system the officers performing each particular piece of work, whether scientific or merely professional, are for the most part in water-tight compartments; there are differences in the amount of special instruction they receive, the kind of work they do, and the allowances they get.

It was pointed out in the previous article that according to the present practice the less scientifically trained officers get the lion's share of promotions; that, in fact, the promotion has been in the inverse ratio of the scientific nature of the work done.

It has been urged in defence of this practice that scientific knowledge is of less value in the higher ranks than that which is derived from a complete mastery of all the details of a ship's general organisation, which can only be gained by the constant performance of the "deck duties" to which reference has been made. So that if we take the navigator, the most important scientific officer, on the one hand, and the first lieutenant, the most important deck officer, on the other, the thing works out in this way. The navigator, because his duties are so onerous and are never changed, knows nothing of deck duties. The first lieutenant, because his duties are never changed, is unlikely ever to become a competent navigator. The navigator, because he has not had an opportunity of learning deck duties, has his promotion retarded so that he can never get on the active list of admirals. The first lieutenant, because he is necessarily familiar with deck duties, is the first to be promoted, and is thus sure of employment on the active list of admirals.

The baneful effects of such a system as this, which are two-fold, were fully set out in our previous article. The Admiralty indicated its contempt for scientific as opposed to mere professional training, and the Admirals' list was swamped by men who knew little of navigation, although this, of course, finds one of its

highest outcomes in handling ships in tactical exercises and in order of battle.

It was next shown that while, as determined by the scheme, the interchangeability of all officers, including the engineer officers, *must* be secured ten years hence, there were reasons why the interchangeability of at least some of the duties of the existing executive officers should be commenced at once. We rejoice to learn from the new circular that this also is to be done.

Lieutenants (N.) will in future be placed on exactly the same footing as regards executive command and ship's duty generally as gunnery and torpedo lieutenants, and are not to be excused from any ship's duties except those which interfere with the special duties pertaining to them. They will be appointed and succeed to the position of first lieutenant, if a vacancy occurs, in all ships where a commander is borne exactly in the same manner as any other specialist officer.

In rendering the special report on the qualifications of a navigating officer, a further clause is to be added, dealing with his capabilities as an executive officer.

Further, midshipmen who show special aptitude are, whenever possible when the ship is under way, to be taken off other duties, and to navigate the ship independently from the after bridge, fixing positions on the chart, and bringing the result of such work to the navigating officer.

Instead of one commissioned officer taking sights and working the reckoning daily, arrangements are to be made, when practicable, for one junior lieutenant or sub-lieutenant to be taken partially off watch-keeping so as to work with the navigating officer for ten working days under way.

The officer thus told off is to be on deck when coasting, making the land, going in and out of harbour, &c., and is to be in every way encouraged to get an insight into navigating duties. If at the end of the ten days the captain is satisfied with his work, he will be relieved and another officer is to be told off for this duty.

These important changes can be urged on two grounds. In the first place, there is the obvious benefit to the Service which will be secured when all captains and admirals are made equally acquainted with both their scientific and professional duties by interchanging them while they are lieutenants and commanders. In the second place, the preparation and simplification of the carrying out of the new scheme, by which another class of specialised officers, the engineers, will be introduced in the future, will be vastly facilitated by organising and testing the best way of interchanging duties on a small scale over a limited area.

We have referred chiefly to the navigator among the scientific officers, and no doubt the Admiralty has dealt with him first, because his duties are the most specialised; but if the interchange is advantageous in his case, the other specialists will follow, and, speaking only from the scientific side, knowing nothing of professional difficulties to be surmounted, it seems to us that such a preliminary experimental study of the

problem which awaits the Admiralty in the future, and which, if faced along the whole line, at the same time, may prove of Herculean proportions and be fraught with dangers of breakdowns, must commend itself as a scientific method. Our view of the wisdom of such an interchangeability among the present officers is strengthened by information which has been furnished us as to the procedure in the German Navy, which enables us to compare the two systems, and in our opinion fully justifies the policy of the new circular.

The distribution of duties amongst executive officers of the German Navy is as follows. As in the British Service every officer is educated in seamanship, navigation, gunnery and torpedo service. In the course of their service the various qualifications of the officers are carefully noted, and especially if they show superiority in any one of the above-mentioned branches. Ships in the German Navy are commissioned for two years. The list of officers for any given ship is made out by the Admiralty at Berlin. The next senior officer after the captain becomes the executive officer. After him the officer who is most proficient (according to the returns) in navigation and pilotage is appointed as navigating officer, without regard to seniority as lieutenant. He who is most proficient in gunnery is appointed "artillery officer," and so with the torpedo officer. Qualification regulates the selection of each officer for special duties, not his seniority as lieutenant. The specialisation of an officer for any particular duty only lasts for the two years' commission. In the next commission the navigating officer may be artillery or torpedo officer, or an ordinary watch keeper without special duty. It is *exceedingly rare* for an officer to be appointed for navigating duties for more than two years, as the Admiralty require every officer to go through a probation as navigator in order to ensure that captains who are responsible for the navigation of the ship shall know their work in that respect. An apparently weak point in this system is that for a time after the appointment of an officer to navigating duties ships are not so well navigated as they might be, since for the first few months of his time the navigator is really learning his work. Gunnery and torpedo work may be learnt in harbour, but navigating can only be learnt by actual practice and experience at sea. But, on the other hand, the strength of this system is that all officers have practical training at sea as navigators *with a captain who has gone completely through the navigating mill*, and knows how to detect any failure in the navigator which might endanger the ship. For squadrons an officer who has shown good ability as navigator in a single ship is selected as navigator.

On this system, whilst ability in any branch (N., G. or T.) is recognised, an officer is not unduly specialised to the detriment of his knowledge in other branches of his profession. In the British Navy the gunnery and torpedo officers are occupied with their special duties nearly the whole of their time as lieutenant, but they go to deck duties when promoted commander, although their knowledge of navigation and the handling of the larger ships is practically nil. But the

navigator is occupied in special duties when promoted commander as well as during his service as lieutenant, *some fifteen years in all at least*, and is allowed no practice in other branches of a naval officer's profession, and because he has not been allowed to have any such practice, he is discharged to the coast guard, his naval career is broken, and the Service loses a man who has had the best possible training for leading ships into action.

Surely this comparison shows that the question of interchangeability has already been considered in the German Navy on the lines which we indicated as beneficial for our own; and in this we see an additional argument why the preliminary trial which we suggested on scientific grounds in our own Navy, and to which the Admiralty now stands committed, should at all events be welcomed as a first step to the wider interchangeability to which the Admiralty is certain to be forced in the future, for of the progress and need of science in the armed service of a nation there will be no end.

THE DISTRIBUTION OF DISEASES.

The Geography of Disease. (Cambridge Geographical Series.) By Frank G. Clemow, M.D. Edin., D.P.H. Camb. Pp. xiv + 624. (Cambridge: University Press, 1903.) Price 15s. 6d.

THE present writer had occasion recently to endeavour to ascertain, from the literature available in London, the distribution of a particular tropical disease. After spending several months on the work, the conclusion left on his mind was that the task was impossible in London alone, and that similar work in continental libraries would have to be undertaken before an accurate idea could be obtained. There is another method possible in the study of distribution, viz. personal investigation in various countries into the occurrence of a particular disease. The difficulties in the way of this method are perhaps not so great as one would think.

A notable instance of what we mean has lately been afforded by Hutchinson in his study of the "fish" ætiology of leprosy. Not content with accepting all evidence second-hand, he proceeded to South Africa and India and inquired critically into the statements which had been made against his view, with the result that many if not all of the "facts" (such as p. 229, "leprosy is found to be common in people whose religion and customs forbid them to touch fish") quoted as opposed to his views he was easily able to show were not facts at all, but mere hearsay evidence, which by constant repetition is at last generally believed. Many instances of this kind have come within the writer's own experience. Thus when first the mosquito malaria theory was definitely established on a basis of fact, it was asserted in print over and over again that no mosquitoes existed in such a place, but that malaria was rife there. As it was important to examine into these statements, the circumstances were carefully investigated in each particular instance, with the result that the "facts" vanished into thin air.

Another striking example is Manson's theory of